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INTERNAL LETTER

Date: August 20, 1980 No: SFR/80-6  
TO: Gary Burrell FROM: Steve Russell  
Loc/Dept: MD-22 Loc/Dept: MD-45  
CC: Phone: 2505

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Subject: Low-Cost GPS System Diagrams

Enclosed is a set of system-level diagrams that we can use to discuss design issues. The design is not described down to the circuit function level. We need to have a meeting before that is done.

The first diagram shows my concept of an optimum LRU configuration. The antenna and three separate boxes form the set. The RCU is common across all applications and vehicles. The antenna, CDU, and PSU may be designed in several options to meet the special needs of each application or vehicle. A customer-sales-quantity profile for the various options can tell us which markets to go after. The interface concept for the SET LRU configuration is shown on the next page. This is needed so we can discuss interface designs and definitions. The next diagram shows a basic functional concept for a GPS Set. The key element here is that the GPS sensor function ends at the PVT interface. All CDU, Map, control, and NAV functions are done independently of the GPS.

I think that future GPS set design (and for that matter, all advanced NAV systems) should treat the sensor and CDU/NAV requirements separately. This will posture us to address new integrated systems with a variety of high and low quality sensors. This also will allow the GPS (Loran, Omega, ...) designs to be free of issues such as display technology, grid reference system, map type, Nav computations, and waypoint data base.

The GPS sensor LRU concept is shown on the next page. This is a three-LRU configuration where again, the RCU is common across all applications. Antenna and power system may be application or vehicle unique. This is the top level diagram that will be used to address GPS-unique issues. The sensor interface concept on the next page illustrates LRU and external interfaces. The PVT, SV/Antenna, and RCU power interfaces, are common across all sets. Prime power and antenna/RCU interfaces will likely be application/vehicle dependent.

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The next page shows a detailed functional block diagram for a low-cost two-channel set. This is the baseline concept from which we will develop future designs. Primary features are:

- 1) Two correlator channels
- 2) Sequential tracking
- 3) Two processors
- 4) PVT serial interface

These choices, and others, should be discussed in detail.

The next three pages show the simplified interfacing for three of the major functions in the previous block diagram. These can be used to help discuss the operation of these elements and also to clarify the interconnections on the detailed block diagram you received previously.

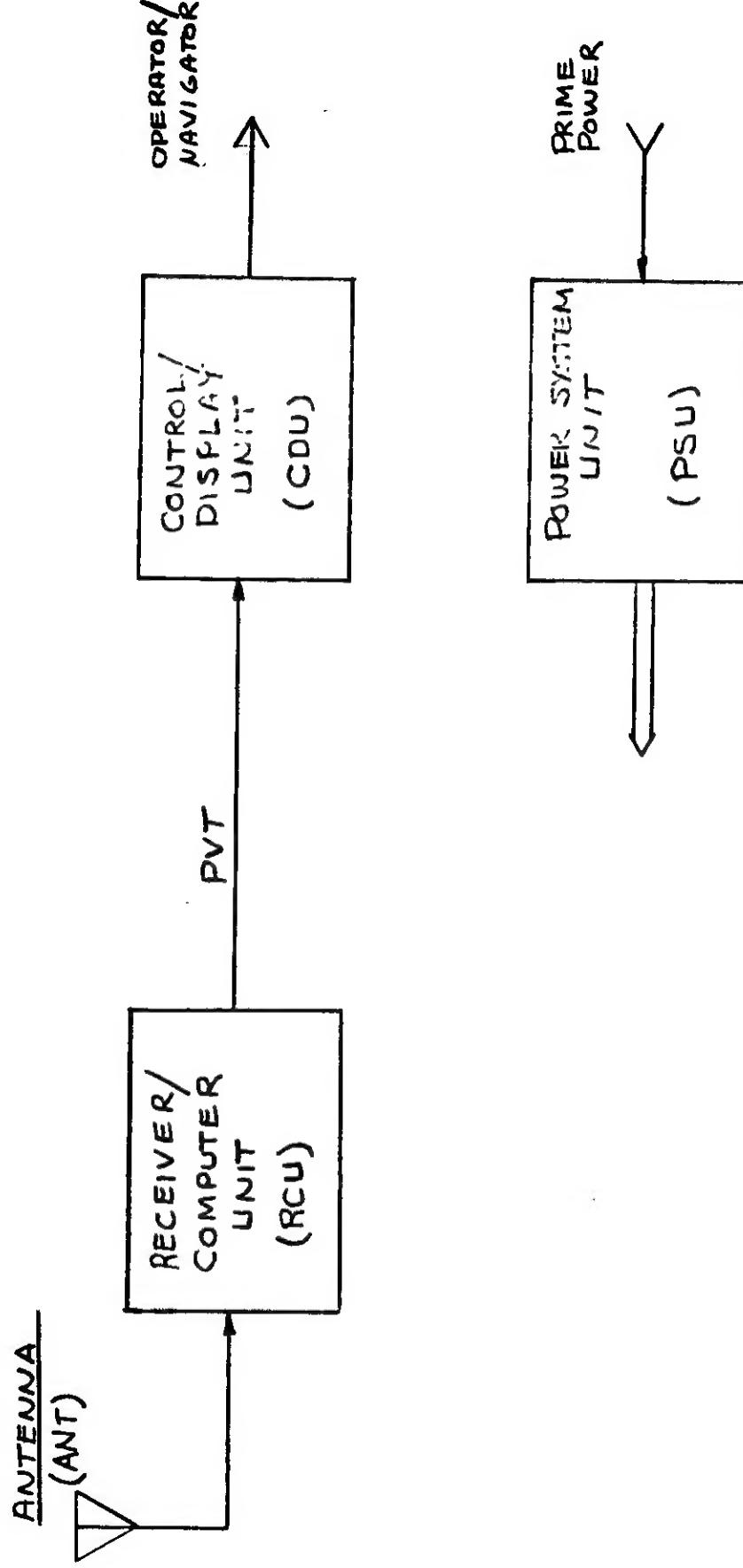
I think we are ready for a general meeting to discuss the low-cost GPS sensor and CDU/NAV efforts.

SFR:csf

Attachment

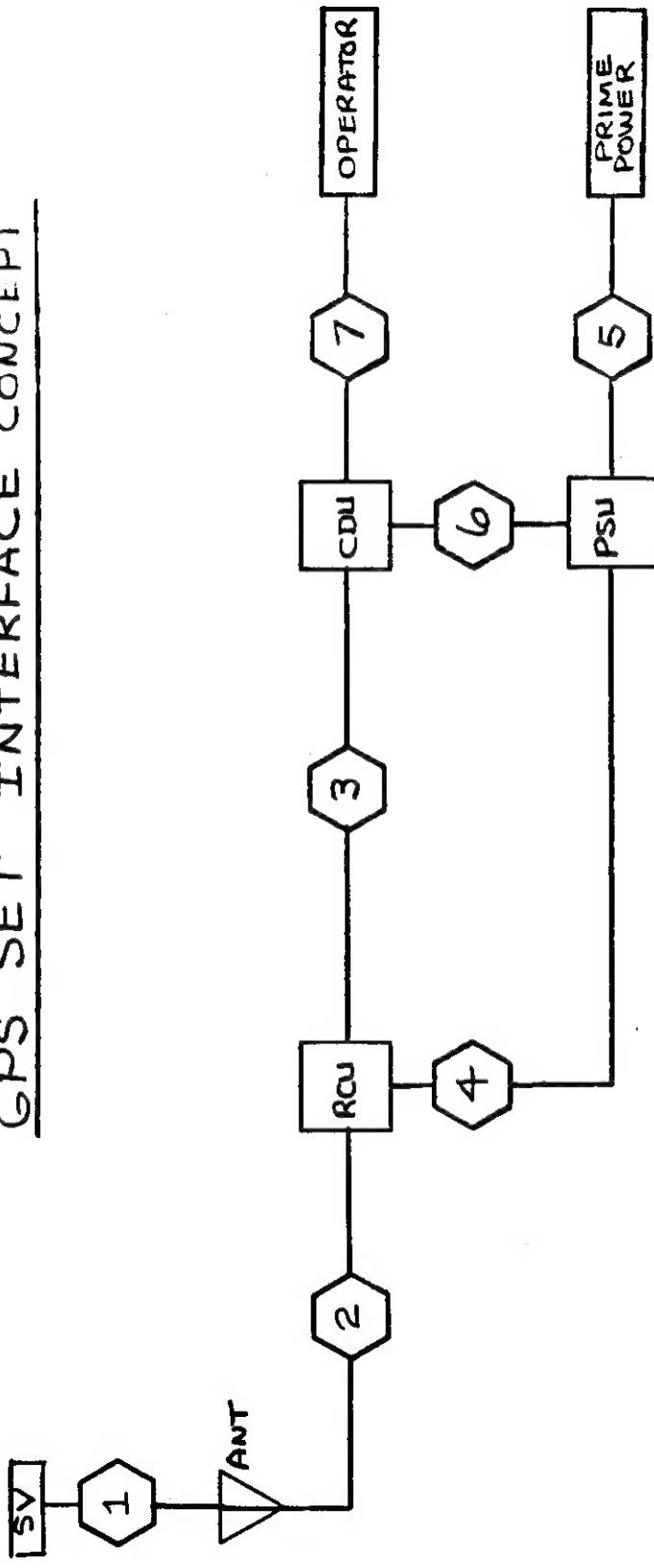
*Steve J. Russell*

## GPS SET LRU CONCEPT



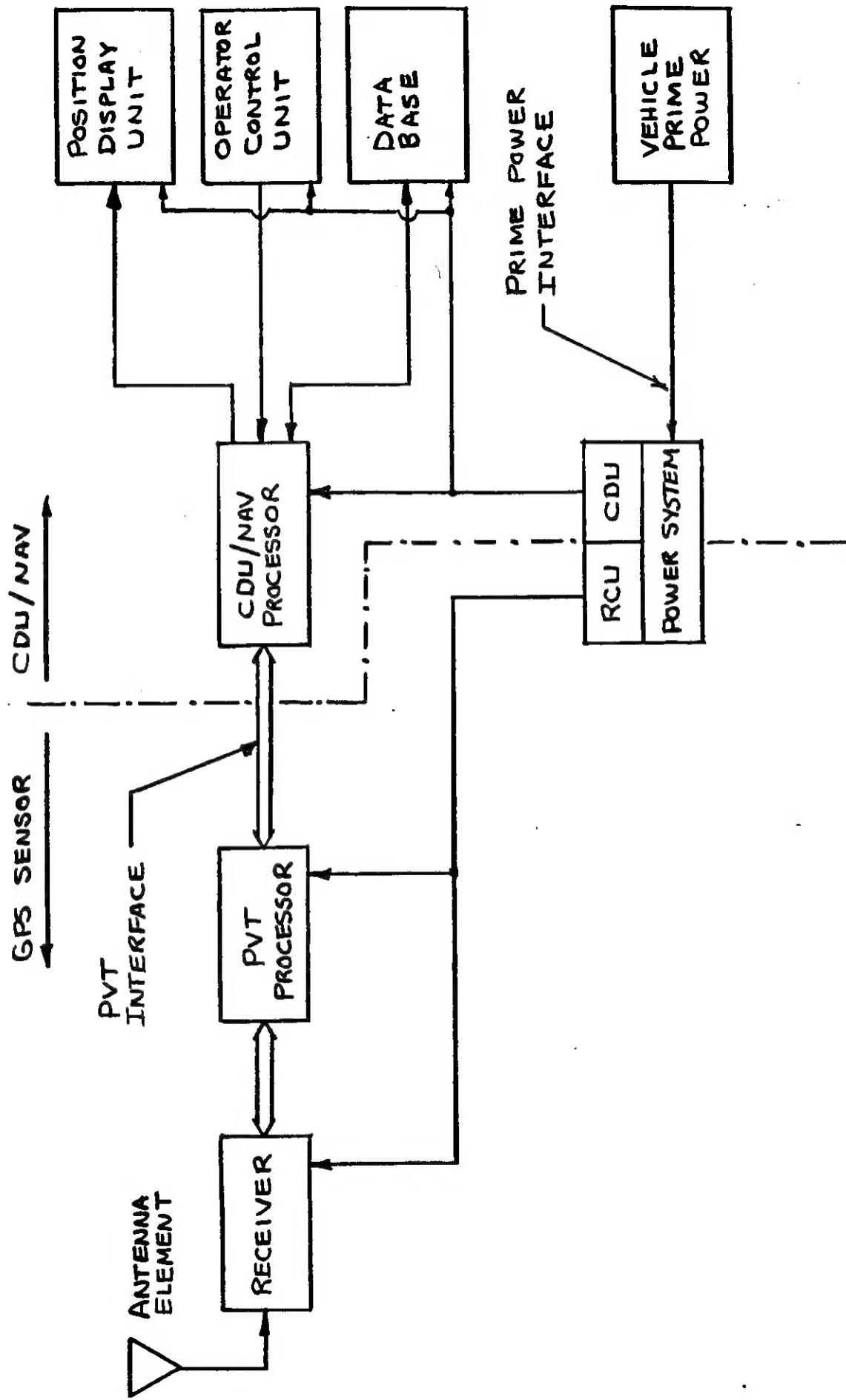
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## GPS SET INTERFACE CONCEPT



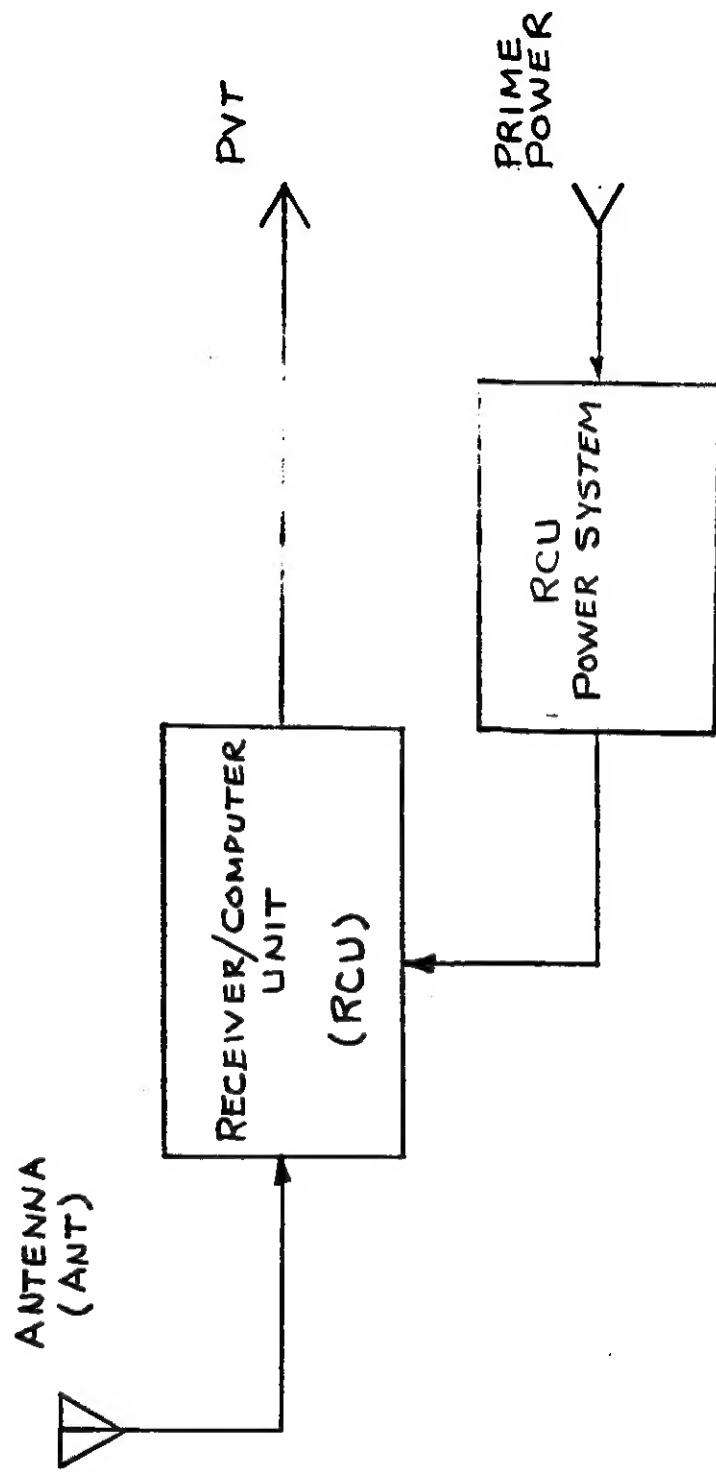
- (1) - SV/Antenna Interface
- (2) - Antenna/RCU Interface
- (3) - PVT Interface
- (4) - RCU Power Interface
- (5) - Prime Power Interface
- (6) - CDU Power Interface
- (7) - CDU Operator Interface

## LOW-COST GPS SYSTEM CONCEPT



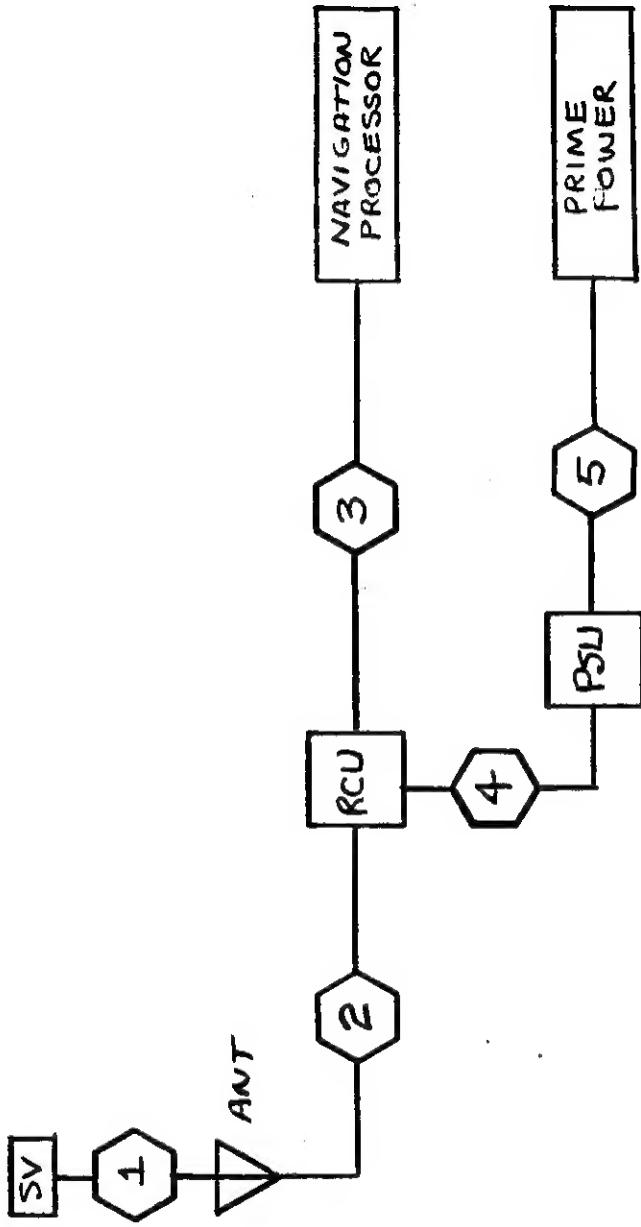
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GPS SENSOR LRU CONCEPT



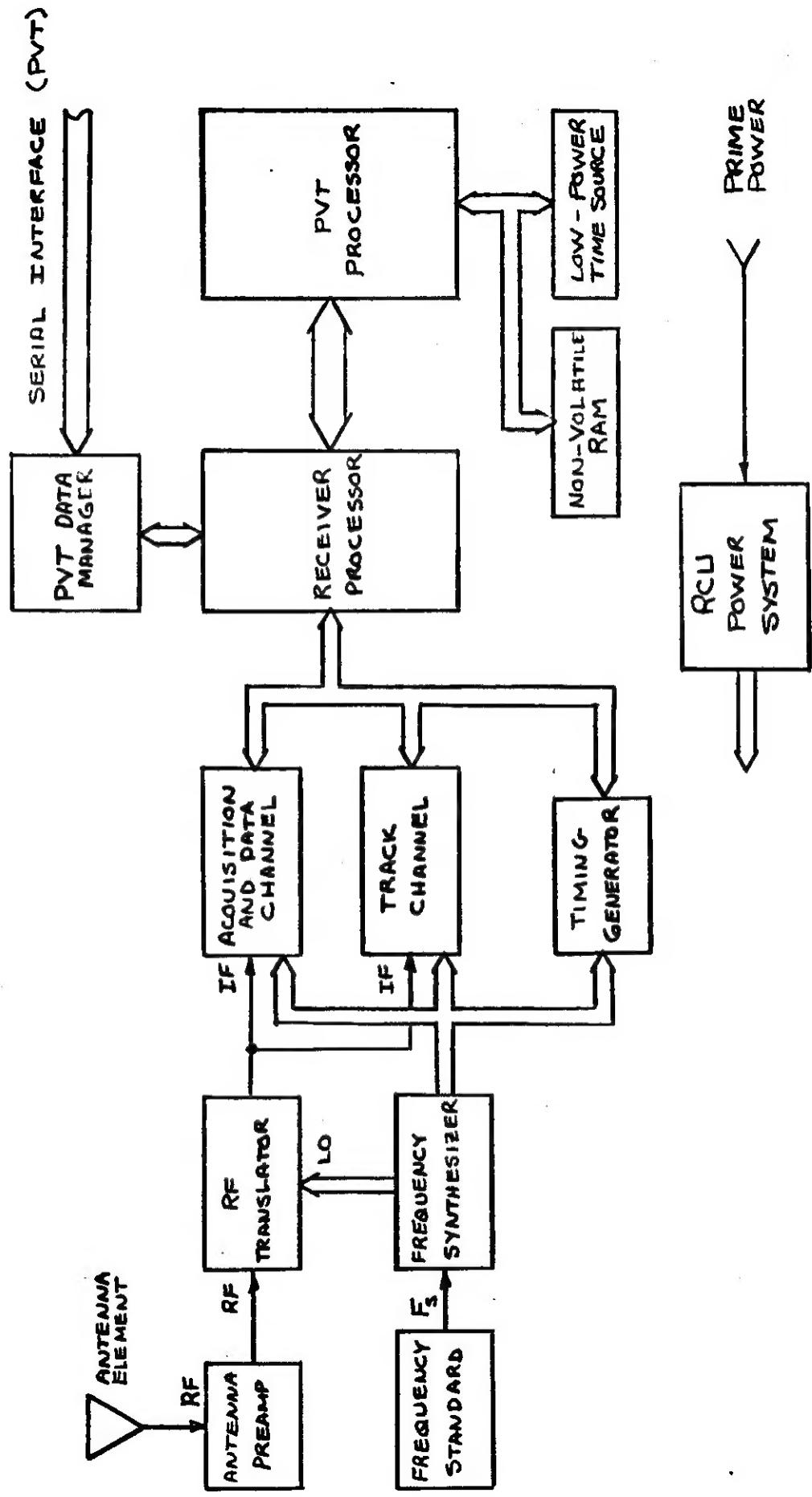
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## GPS SENSOR INTERFACE CONCEPT

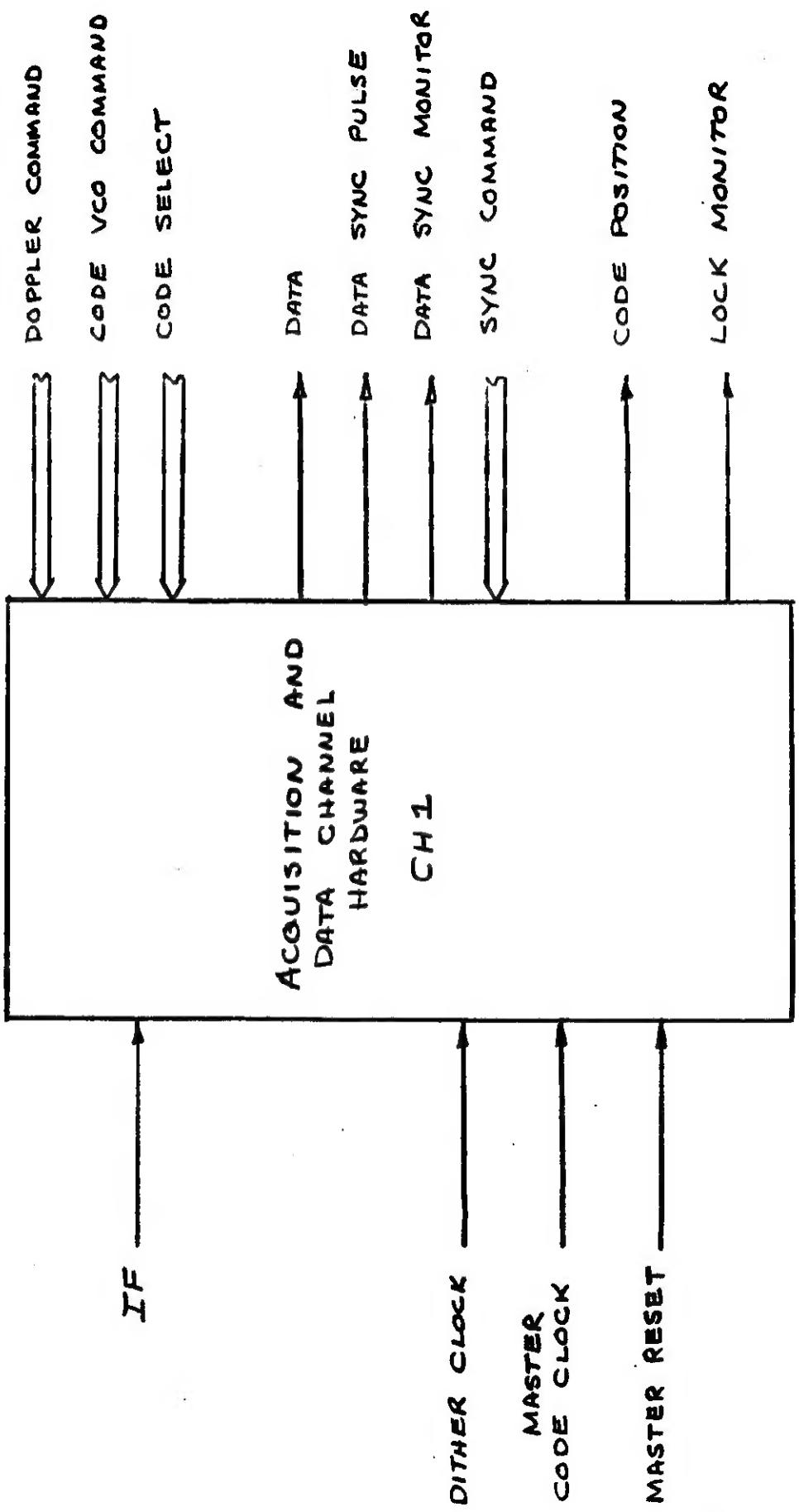


- 1 - SV/Antenna Interface
- 2 - Antenna / RCU Interface
- 3 - PVT Interface
- 4 - RCU Power Interface
- 5 - Prime Power Interface

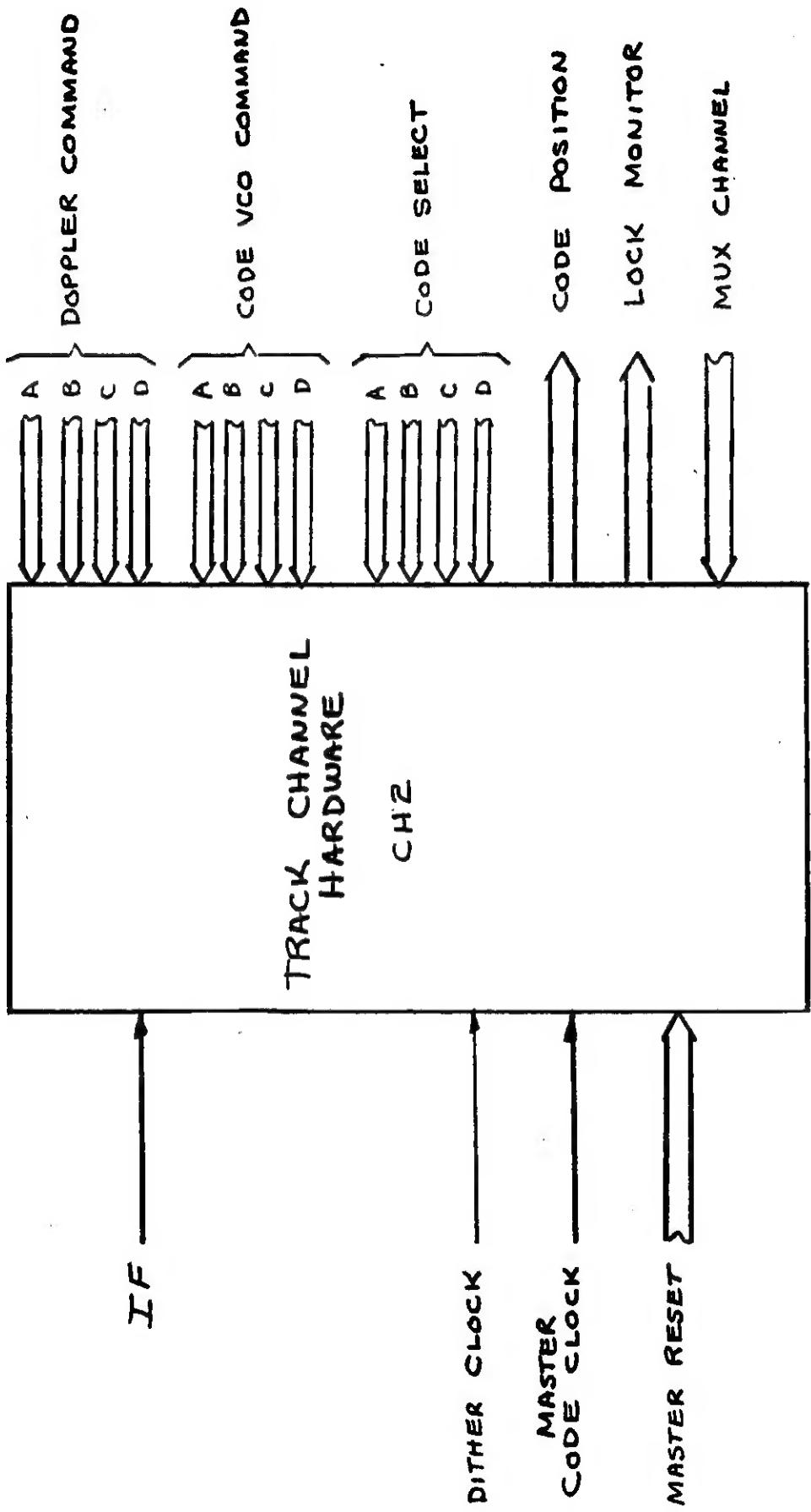
## BASELINE FUNCTIONAL BLOCK DIAGRAM



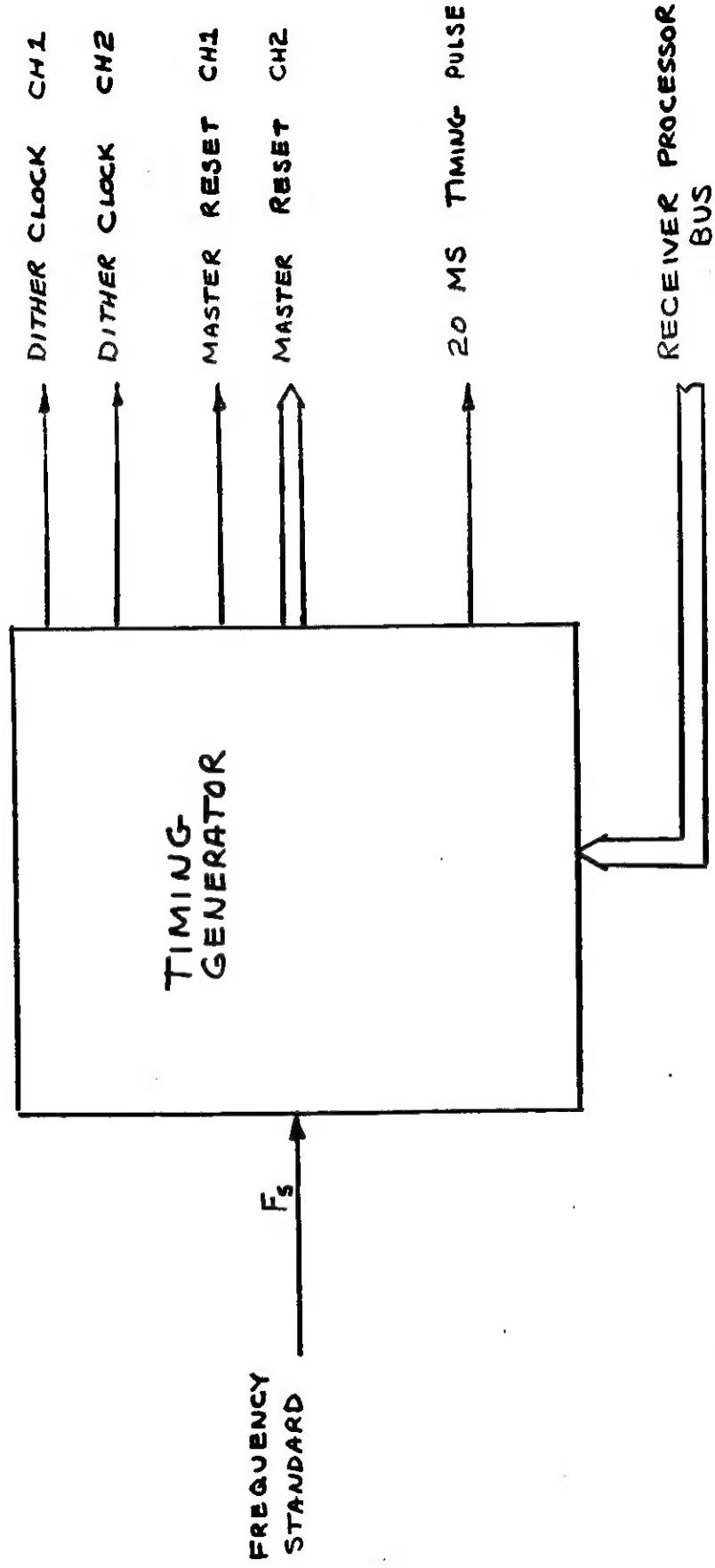
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